AC6901A 芯片规格书

珠海市杰理科技有限公司

版本：**V1.2**

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AC6901A Features

High performance 32-bit RISC CPU

- RISC 32bit CPU
- DC-160MHz operation
- Support DSP instructions
- 64Vectored interrupts
- 4 Levels interrupt priority

Flexible I/O

- 30 GPIO pins
- All GPIO pins can be programmable as input or output individually
- All GPIO pins are internal pull-up/pull-down selectable individually
- CMOS/TTL level Schmitt triggered input
- External wake up/interrupt on all GPIOs

Peripheral Feature

- One full speed USB 2.0 OTG controller
- One audio interface supports IIS, left adjusted, right adjusted and DSP mode
- Four multi-function 16-bit timers, support capture and PWM mode
- Two 16-bit PWM generator for motor driving
- One 16-bit active parallel port
- One full-duplex basic UART
- Two full-duplex advanced UART
- Two SPI interface supports host and device mode
- Two SD Card Host controller
- One IIC interface supports host and device mode
- Watchdog
- 2 Crystal Oscillator
- 16-bit Stereo DAC, SNR > 92dB
- 3 channels Stereo ADC, SNR > 92dB
- 1 channel MIC amplifier
- Embedded headphone amplifier
- 3 channels Stereo analog MUX
- channels 10-bit ADC
- 2 channels 4 levels Low Voltage Detector
- Built in Cap Sense Key controller
- Power-on reset
- Embedded PMU

Bluetooth Feature

- CMOS single-chip fully-integrated radio and baseband
- Compliant with Bluetooth V4.2+BR+EDR+BLE specification
- Bluetooth Piconet and Scatternet support
- Meet class2 and class3 transmitting power requirement
- Provides +2dbm transmitting power
- receiver with -85dBm sensitivity
- Support a2dp\avctp\avdtp\avrcp\hfp\spp\smp\att\gap\gatt\rfcomm\sdp\l2cap profile

FM Tuner

- Support worldwide frequency band 76-108MHz
- Fully integrated digital low-IF tuner & frequency synthesizer
- Autonomous search tuning
- Digital auto gain control (AGC)
- Digital adaptive noise cancellation
- Programmable de-emphasis (50/75 uS)
- Receive signal strength indicator (RSSI)
- Digital volume control

Power Supply

- LDOIN is 3.3V to 5.5V
- VDDIO is 3.0V to 3.6V

Packages

- LQFP48

Temperature

- Operating temperature: -40℃ to +85℃
- Storage temperature: -65℃ to +150℃

一、引脚定义

1.1 引脚分配

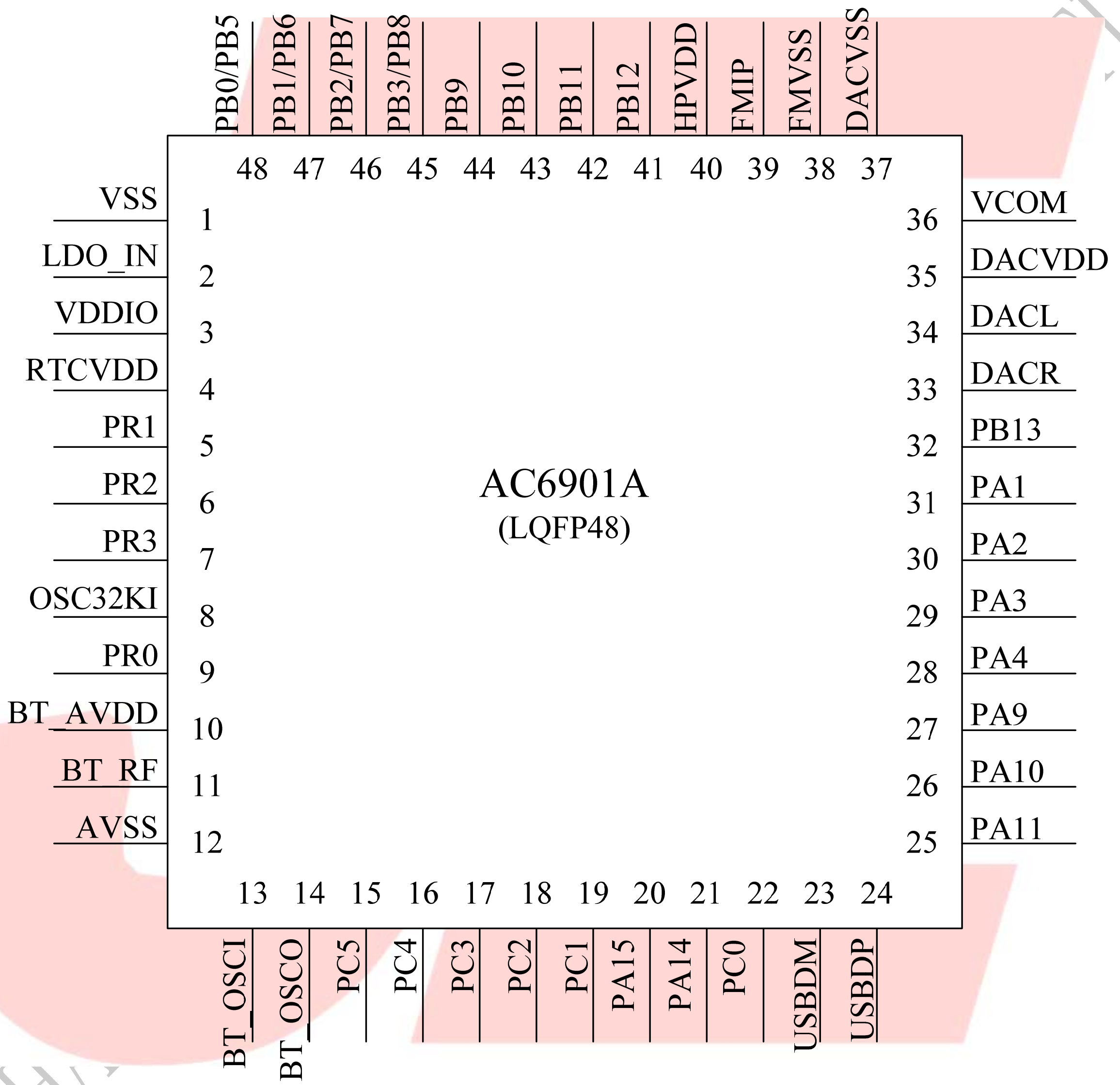


图 **1-1 AC6901A_LQFP48** 引脚分配图

1.2 引脚描述

表 1-1 AC6901A_LQFP48 引脚描述

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	VSS	P	/	Ground	
2	LDO_IN	P	/	LDO Power	
3	VDDIO	P	/	IO Power 3.3v	
4	RTCVDD	P	/	RTC Power 3.3v	
5	PR1	I/O	16	RTCIO1	ADC12：ADC Input Channel 12;
6	PR2	I/O	16	RTCIO2	ADC13：ADC Input Channel 13;
7	PR3	I/O	16	RTCIO3	OSC12MO
8	OSC32KI	I	/	OSC32KI	
9	PR0	I/O	16	RTCIO0	OSC32KO
10	BT_AVDD	P	/	Power 1.5v	
11	BT_RF	P	/		
12	AVSS	P	/	Ground	
13	BT_OSCI	I	/	OSC In	
14	BT_OSCO	O	/	OSC Out	
15	PC5	I/O	16	GPIO	COM0：LCD COM Output 0; SEG21：LCD SEG Output21; SD1CLKA：SD1 Clk(A); PAPWR：PAP Write; SPI1DOB：SPI1 Data Out(B); UART2RXD：Uart2 Data In(D) IIC_SDA_B：IIC SDA(B);
16	PC4	I/O	16	GPIO	COM1：LCD COM Output 1; SEG20：LCD SEG Output20; SD1CMDA：SD1 Command(A); PAPRD：PAP Read; SPI1CLKB：SPI1 Clk(B); UART2TXD：Uart2 Data Out(D); IIC_SCL_B：IIC SCL(B);
17	PC3	I/O	16	GPIO	COM2：LCD COM Output 2; SEG19：LCD SEG Output19; SD1DAT0A：SD1 Data0(A); PAPD7：PAP Data 7; SPI1DIB：SPI1 Data In(B); UART0RXC：Uart0 Data In(C)

18	PC2	I/O	16	GPIO	COM3：LCD COM Output 3; SEG18：LCD SEG Output18; SD1DAT1A：SD1 Data1(A); PAPD6：PAP Data 6; SPI2DIB：SPI2 Data In(B); UART0TXC：Uart0 Data Out(C); CAP1：Timer1 Capture;
19	PC1	I/O	16	GPIO	COM4：LCD COM Output 4; SEG17：LCD SEG Output17; SD1DAT2A：SD1 Data2(A); PAPD5：PAP Data 5; SPI2DOB：SPI2 Data Out(B); UART1RXB：Uart1 Data In(B);
20	PA15	I/O	16	GPIO	SEG15：LCD SEG Output15; CAP2：Timer2 Capture; UART0RXD：Uart0 Data In(D) LNA_EN： ALNK_MCLKA：Audio Link Master Clk(A); IIC_SDA_B：IIC SDA(B);
21	PA14	I/O	16	GPIO	SEG14：LCD SEG Output14; TMR1：Timer1 Clock Input； UART0TXD：Uart0 Data Out(D); PA_EN： ALNK_DAT3A：Audio Link Data3(A); IIC_SCL_C：IIC SCL(C); Wakeup4：Port Interrupt /Wakeup 4;
22	PC0	I/O	16	GPIO	COM5：LCD COM Output 5; SEG16：LCD SEG Output16; SD1DAT3A：SD1 Data3(A); PAPD4：PAP Data 4; SPI2CLKB：SPI2 Clk(B); UART1TXB：Uart1 Data Out(B);
23	USBDM	I/O	4	USB Negative Data	ISP_DI:
24	USBDP	I/O	4	USB Positive Data	ISP_DO:
25	PA11	I/O	16	GPIO	SEG11：LCD SEG Output11; SD0DAT0A：SD0 Data0(A); ALNK_DAT0A：Audio Link Data0(A);
26	PA10	I/O	16	GPIO	SEG10：LCD SEG Output10; SD0DAT1A：SD0 Data1(A); UART2RXB：Uart2 Data In(B);

					ADC5：ADC Input Channel 5; ALNK_LRCKA：Audio Link Clk(A); PAPD3：PAP Data3; Wakeup3：Port Interrupt /Wakeup 3;
27	PA9	I/O	16	GPIO	SEG9：LCD SEG Output9; SD0DAT2A：SD0 Data2(A); UART2TXB：Uart2 Data Out(B); ADC4：ADC Input Channel 4; ALNK_SCLKA：Audio Link Clk(A); PAPD2：PAP Data2;
28	PA4	I/O	16	GPIO	SEG4：LCD SEG Output4; AMUX1R：Simulator Channel1 Right; Touch11：Touch Input Channel 11; ADC1：ADC Input Channel 1; UART2RXA：Uart2 Data In(A); PWM1：Timer1 PWM Output;
29	PA3	I/O	16	GPIO	SEG3：LCD SEG Output3; AMUX1L：Simulator Channel 1 Left; Touch10：Touch Input Channel 10; ADC0：ADC Input Channel 0; UART2TXA：Uart2 Data Out(A); ISP_CLK： Wakeup8：Port Interrupt /Wakeup 8;
30	PA2	I/O	16	GPIO	SEG2：LCD SEG Output2; AMUX0R：Simulator Channel0 Right; Touch9：Touch Input Channel 9; CAP3：Timer3 Capture; UART1RXC：Uart1 Data In(C);
31	PA1	I/O	16	GPIO	SEG1：LCD SEG Output1; AMUX0L：Simulator Channel0 left; Touch8：Touch Input Channel 8; PWM0：Timer0 PWM Output; UART1TXC：Uart1 Data Out(C);
32	PB13	I/O	16	GPIO	MIC
33	DACR	O	/	DAC Right Channel	

34	DACL	O	/	DAC Left Channel	
35	DACVDD	P	/	DAC Power	
36	VCOM	P	/	DAC Reference	
37	DACVSS	P	/	DAC Ground	
38	FMVSS	P	/		
39	FMIP	I	/		
40	HPVDD	P	/		
41	PB12	I/O	24	GPIO	AMUX2R：Simulator Channel2 Right; NFCRX：NFC Data In Touch7：Touch Input Channel 7; ADC11：ADC Input Channel 11; SPI1DOA：SPI1 Data Out(A); SD0CLKB:SD0 Clk(B);
42	PB11	I/O	24	GPIO	AMUX2L：Simulator Channel2 Left; NFCTX：NFC Data Out Touch6：Touch Input Channel 6; ADC10：ADC Input Channel 10; SPI1CLKA：SPI1 Clk(A); SD0CMDB：SD0 Command(B); Wakeup13：Port Interrupt /Wakeup 13;
43	PB10	I/O	24	GPIO	UART2RXC：Uart2 Data In(C); Touch5：Touch Input Channel 5; ADC9：ADC Input Channel 9; SPI1_DIA：SPI1 Data In(A); SD0DAT0B：SD0 Data0(B); CAP0：Timer0 Capture;
44	PB9	I/O	24	GPIO	UART2TXC：Uart2 Data Out(C); ADC8：ADC Input Channel 8; CLKOUT1：Clk Out1; SD0DAT1B：SD0 Data1(B); Wakeup12：Port Interrupt /Wakeup 12;
45	PB8	I/O	24	GPIO	SFC_CLKB：SFC Clock(B); SPI0_CLKB：SPI0 Clock(B); ADC7：ADC Input Channel 7; SD0DAT2B：SD0 Data2(B);
	PB3	I/O	24	GPIO	PWM2：Timer2 PWM Output; SPI0_DAT3AB：SPI0 Data 3(AB); SFC _DAT3AB：SFC Data 2(AB);

					SD1DAT1B：SD1 Data1(B); ALNK_DAT1B ： Audio Link Data1(B); Touch3：Touch Input Channel 3;
46	PB7	I/O	24	GPIO	SFC _DOB(0)：SFC Data Out0(B); SPI0_DOB(0)：SPI0 Data Out0(B); UART0RXB：Uart0 Data In(B); ADC6：ADC Input Channel 6; TMR3：Timer3 Clock Input; SD0DAT3B：SD0 Data3(B);
	PB2	I/O	24	GPIO	SPI2DIA：SPI2 Data In(A); SD1CLKB：SD1 Clk(B); ALNK_DAT0B：Audio Link Data0(B); Touch2：Touch Input Channel 2; Wakeup11：Port Interrupt /Wakeup 11;
47	PB6	I/O	24	GPIO	SFC _CSB：SFC Chip Select(B); SPI0_CSB：SPI0 Chip Select(B); UART0TXB：Uart0 Data Out(B); ALNK_MCLKB：Audio Link Master Clk(B);
	PB1	I/O	24	GPIO	TMR2：Timer2 Clock Input; UART1RXA：Uart1 Data In(A); SPI2DOA：SPI2 Data Out(A); SD1CMDB：SD1 Command(B); ALNK_LRCKB ： Audio Link Clk(B); Touch1：Touch Input Channel 1;
48	PB5	I/O	24	GPIO	SFC _DIB(1)：SFC Data In1(B); SPI0_DIB(1)：SPI0 Data In1(B); SD1DAT3B：SD1 Data3(B); ALNK_DAT3B：Audio Link Data3(B);
	PB0	I/O	24	GPIO	CLKOUT1：Clk Out1; UART1TXA：Uart1 Data Out(A); SPI2CLKA：SPI2 Clk(A); SD1DAT0B：SD1 Data0(B); ALNK_SCLKB：Audio Link Clk(B); Touch0：Touch Input Channel 0; Wakeup10：Port Interrupt /Wakeup 10;

二、电气特性

2.1 PMU 电压、电流特性

表 2-1

符号	参数	最小	典型	最大	单位	测试条件
LDOIN	Voltage Input	3	3.7	5.5	V	
$V_{3.3}$	Voltage output	_	3.3	_	V	LDO5V = 5V, 100mA loading
$V_{1.2}$		_	1.2	_	V	LDO5V = 5V, 50mA loading
$V_{1.5}$	Voltage output		1.5		V	LDO5V=5V, 100mA loading
V_{DACVDD}	DAC Voltage	_	3.1	_	V	LDO5V = 5V, 10mA loading
$I_{L3.3}$	Loading current	_	_	150	mA	LDO5V = 5V

2.2 IO 输入、输出高低逻辑特性

表 2-2

IO 输入特性						
符号	参数	最小	典型	最大	单位	测试条件
V_{IL}	Low-Level Input Voltaget	-0.3	_	0.3* VDDIO	V	VDDIO = 3.3V
V_{IH}	High-Level Input Voltage	0.7* VDDIO	_	VDDIO+0.3	V	VDDIO = 3.3V
IO 输出特性						
V_{OL}	Low-Level Output Voltaget	_	_	0.33	V	VDDIO = 3.3V
V_{OH}	High-Level Output Voltaget	2.7	_	_	V	VDDIO = 3.3V

2.3 IO 输出能力、上下拉电阻特性

表 2-3

Port 口	普通输出	强输出	上拉电阻	下拉电阻	备注
PA0~PA15 PB13 PC0~PC5 PR0-PR3	串接200欧电阻（寄存器可控制）	16mA	10K	60K	1、PA3 default pulldown 2、PB6 default pullup 3、PR0 output 0 4、内部上下拉阻抗因工艺波动差异，可能存在±20%的偏差
PB0~PB12	8mA	24mA	10K	60K	
USBDM USBDP	4mA	_	1.5K	15K	

2.4 DAC 特性

参数	最小	典型	最大	单位	测试条件
Frequency Response	20	_	200000	Hz	1KHz/0dB 10Kohm loading With A-Weighted Filter
THD+N	_	-71	_	dB	
S/N	_	93	_	dB	
Crosstalk	_	-90	_	dB	
Output Swing		1.08		Vrms	
Dynamic Range		93		dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
DAC Output Power	_	>11	_	mW	32ohm loading

2.5 ADC 特性

参数	最小	典型	最大	单位	测试条件
Dynamic Range		93		dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
S/N	_	92	_	dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
THD+N	_	-75	_	dB	
Crosstalk	_	-80	_	dB	

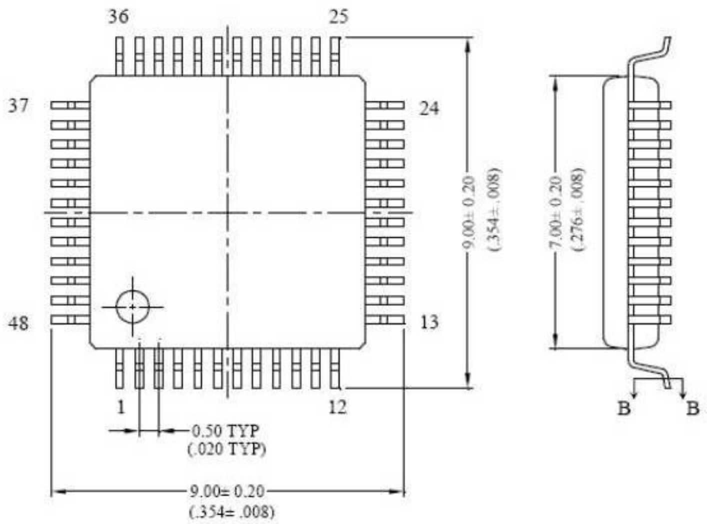
2.6 BT 特性

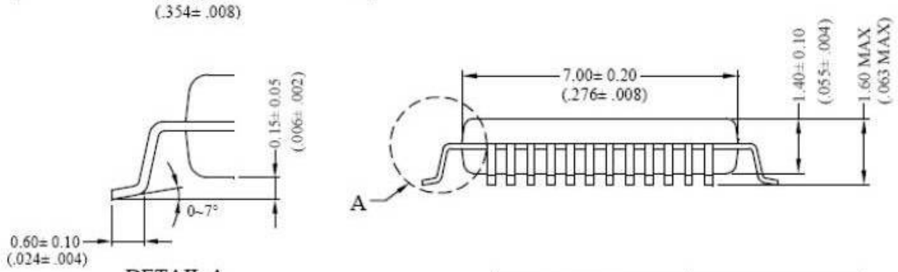
表 2-4

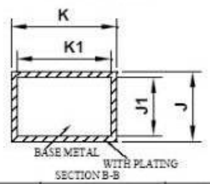
参数	最小	典型	最大	单位	测试条件
Maximum Output Power	_	2	_	dBm	_
RMS DEVM	_	5.3	_	%	Maximum output power
PEAK DEVM	_	12	_	%	
99% DEVM	_	8	_	%	
EDR Relative Power	_	-1.4	_	dB	
BDR Sensitivity	_	-84	_	dBm	BER=0.001
EDR Sensitivity	_	-86	_	dBm	BER=0.0001

三、封装

3.1 LQFP48_7*7







DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
J	0.107	0.197	.0042	.0076
J1	0.107	0.147	.0042	.0058
K	0.200	0.250	.0079	.0098
K1	0.200	0.300	.0079	.0118

引线间距 Lead Pitch	0.50mm(19.7mil)
载体尺寸 Pad Size	205mil×205mil
载体打凹深度 Depressed Die Pad	0.120±0.025 (0.007±0.001)
单位 Unit	mm(inch)

图 3-1 AC6901A_LQFP48 封装图

四、版本信息

日期	版本号	描述
2016.09.12	V1.0	原始版本
2016.12.14	V1.1	升级蓝牙版本为 4.2，增加可支持的蓝牙协议
2016.12.22	V1.2	规范统一蓝牙 4.2 版本格式